2022 Collision Repair Technician—Non-Structural

Program CIP: 47.0603—Autobody/Collision and Repair Technology/Technician

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The Research and Curriculum Unit (RCU), located in Starkville, as part of Mississippi State University (MSU), was established to foster educational enhancements and innovations. In keeping with the land-grant mission of MSU, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

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Acknowledgments

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Dr. Carey M. Wright, state superintendent of education
Ms. Rosemary G. Aultman, chair
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Sam Watts, the curriculum manager for the RCU

Standards

Standards and alignment crosswalks are referenced in the appendix. Depending on the curriculum, these crosswalks should identify alignment to the standards mentioned below, as well as possible related academic topics as required in the Subject Area Testing Program in Algebra I, Biology I, English II, and U.S. History from 1877, which could be integrated into the content of the units. Mississippi's CTE collision repair technician curriculum is aligned to the following standards:

Automotive Service Excellence (ASE) Education Foundation Standards
The ASE Education Foundation is a nonprofit organization that evaluates and accredits entry-level automotive technology education programs against standards developed by the automotive service industry. It also develops career-readiness education for students that fuses local partnerships, rigorous standard-based education, workplace experience, and mentorship together.
aseeducationfoundation.org

International Society for Technology in Education Standards (ISTE)
Reprinted with permission from *ISTE Standards for Students* (2016). All rights reserved. Permission does not constitute an endorsement by ISTE.
iste.org

College- and Career-Readiness Standards
College- and career-readiness standards emphasize critical thinking, teamwork, and problem-solving skills. Students will learn the skills and abilities demanded by the workforce of today and the future. Mississippi adopted Mississippi College- and Career-Readiness Standards (MCCRS) to provide a consistent, clear understanding of what students are expected to learn and so teachers and parents know what they need to do to help them.
mdek12.org/oae/college-and-career-readiness-standards

Framework for 21st Century Learning
In defining 21st-century learning, the Partnership for 21st Century Skills has embraced key themes and skill areas that represent the essential knowledge for the 21st century: global awareness; financial, economic, business and entrepreneurial literacy; civic literacy; health literacy; environmental literacy; learning and innovation skills; information, media, and technology skills; and life and career skills. 21 *Framework Definitions* (2019).
battelleforkids.org/networks/p21/frameworks-resources

Preface

Secondary CTE programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing applied learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments. This document provides information, tools, and solutions that will aid students, teachers, and schools in creating and implementing applied, interactive, and innovative lessons. Through best practices, alignment with national standards and certifications, community partnerships, and a hands-on, student-centered concept, educators will be able to truly engage students in meaningful and collaborative learning opportunities.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, *Mississippi Code of 1972*, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, Ch. 487, §14; Laws, 1991, Ch. 423, §1; Laws, 1992, Ch. 519, §4 eff. from and after July 1, 1992; Strengthening Career and Technical Education for the 21st Century Act, 2019 [Perkins V]; and Every Student Succeeds Act, 2015).

Mississippi Teacher Professional Resources

The following are resources for Mississippi teachers:

Curriculum, Assessment, Professional Learning
: Program resources can be found at the RCU's website, rcu.msstate.edu.

Learning Management System: An Online Resource
: Learning management system information can be found at the RCU's website, under Professional Learning.

Should you need additional instructions, call the RCU at 662.325.2510.

Executive Summary

Pathway Description
Collision repair technician is a pathway for students in the transportation career cluster. The following description is from the current Standard Course of Study for Career-Technical Education, Mississippi Department of Education. Collision Repair is a hands-on program that will prepare students for employment or continuing education in the collision repair industry. The content is based on industry content. The content consists of fundamentals of collision, nonstructural analysis and damage repair, structural analysis and damage repair, and painting and refinishing.

The program is aligned with the ASE 2021 Collision Repair and Refinishing standards, which were retrieved March 25, 2021, from aseeducationfoundation.org/uploads/2021-Collision-Program-Standards-FV-13Jan2021.pdf.

College, Career, and Certifications
The collision repair technician pathway was written to incorporate the ASE Education Foundation. Any student who successfully completes this program will be eligible to apply to take the ASE exams. ASE requires two years of employment before certificates are issued. Students receive one year of credit for completion of the secondary program. Students who take certifications before meeting the two-year requirement is met will be granted certifications after completing one year of collision repair employment. Each district should implement a maximum student number due to the size of each lab. Programs seeking certification may receive certification in non-structural or in other areas if they so desire.

Grade Level and Class Size Recommendations
It is recommended that students enter this program as a 10th grader. Exceptions to this are a district-level decision based on class size, enrollment numbers, student maturity, and CTE delivery method. This is a hands-on, lab- or shop-based course. Therefore, a maximum of 15 students is recommended per class with only one class with the teacher at a time.

Student Prerequisites
For students to experience success in the program, the following student prerequisites are suggested:

1. C or higher in English (the previous year)
2. C or higher in high school-level math (last course taken or the instructor can specify the level of math instruction needed)
3. Instructor approval and TABE reading score (eighth grade or higher)

or

1. TABE reading and math score (eighth grade or higher)
2. Instructor approval

or

1. Instructor approval

Assessment
The latest assessment blueprint for the curriculum can be found at rcu.msstate.edu/curriculum/curriculumdownload.

Teacher Licensure
The latest teacher licensure information can be found at mdek12.org/oel/apply-for-an-educator-license.

Professional Learning
If you have specific questions about the content of any of the training sessions provided, please contact the RCU at 662.325.2510.

Course Outlines

Option 1— Four 1-Carnegie-Unit Courses
This curriculum consists of four 1-credit courses, which should be completed in the following sequence:

1. **Concepts of Collision Repair - Non-Structural I—Course Code: ######**
2. **Concepts of Collision Repair - Non-Structural II—Course Code: ######**
3. **Advanced Concepts of Collision Repair - Non-Structural I—Course Code: ######**
4. **Advanced Concepts of Collision Repair - Non-Structural II—Course Code: ######**

Course Description: Concepts of Collision Repair - Non-Structural I
This course contains information on safety, tool identification/use, , service specification and service information, measurement, personal/business finance, employability skills and welding safety.

Course Description: Concepts of Collision Repair - Non-Structural II
This course contains information and skills relating to inspecting and analyzing body components, repairs to outer body panels, frame inspection and repair, unibody inspection and repair, and introductory welding/cutting applications.

Course Description: Advanced Concepts of Collision Repair - Non-Structural I
This course contains information on safety, tool identification/use, employability skills, personal and business skills, metal finishing, and body filling.

Course Description: Advanced Concepts of Collision Repair - Non-Structural II
This course contains information and skills relating to movable glass/hardware, fixed-glass procedures, plastics, adhesives, welding, painting equipment, surface preparation, and mixing and matching paint.

Concepts of Collision Repair - Non-Structural I—Course Code: ######

Unit	Unit Name	Hours
1	Orientation	15
2	Workplace Employability Skills	10
3	Collision Repair Shop and Personal Safety	30
4	Tools and Equipment	30
5	Preparing a Vehicle for Service	30
6	Welding, Cutting, and Joining: Safety Precautions	25
Total		**140**

Concepts of Collision Repair - Non-Structural II—Course Code: ######

Unit	Unit Name	Hours
7	Welding, Cutting, and Joining: Metal Welding, Cutting, and Joining	52
8	Damage Analysis, Estimating, and Customer Service: Safety Precautions	22
9	Damage Analysis, Estimating, and Customer Service: Damage Analysis	22
10	Damage Analysis, Estimating, and Customer Service: Estimating	22
11	Damage Analysis, Estimating, and Customer Service: Vehicle Construction and Parts	22
Total		**140**

Advanced Concepts of Collision Repair - Non-Structural I—Course Code: ######

Unit	Unit Name	Hours
12	Orientation and Safety Review	10
13	Damage Analysis, Estimating, and Customer Service: Customer Relations and Sales Skills	10
14	Basic Non-Structural Analysis and Damage Repair: Outer Body Panel Repairs, Replacements, and Adjustments	60
15	Non-Structural Analysis and Damage Repair: Metal Finishing and Body Filling	60
Total		**140**

Advanced Concepts of Collision Repair - Non-Structural II—Course Code: ######

Unit	Unit Name	Hours
16	Non-Structural Analysis and Damage Repair: Moveable Glass and Hardware	50
17	Non-Structural Analysis and Damage Repair: Plastics, Adhesives, and Welding	50
18	Painting and Refinishing: Equipment, Surface Preparation, Mixing, Matching, and Applying	40
Total		**140**

Option 2—Two 2-Carnegie-Unit Courses
This curriculum consists of two 2-credit courses, which should be completed in the following sequence:

1. **Collision Repair Technician – Non-Structural I—Course Code: ######**
2. **Collision Repair Technician – Non-Structural II—Course Code: ######**

Course Description: Collision Repair Technician – Non-Structural I
This course contains information on safety, tool identification/use, employability skills, collision estimating, service specification and service information, measurement, personal/business finance inspecting, analyzing body components, repairs to outer body panels, frame inspection and repair, unibody inspection and repair, and introductory welding/cutting applications.

Course Description: Collision Repair Technician – Non-Structural II
This course contains information on safety, tool identification/use, employability skills, metal finishing and body filling, movable glass/hardware, frame inspection and repair, unibody measurement and repair, fixed-glass procedures and plastics, adhesives, advanced welding, and paint mixing/matching.

Collision Repair Technician – Non-Structural I—Course Code: ######

Unit	Unit Name	Hours
1	Orientation	15
2	Workplace Employability Skills	10
3	Collision Repair Shop and Personal Safety	30
4	Tools and Equipment	30
5	Preparing a Vehicle for Service	30
6	Welding, Cutting, and Joining: Safety Precautions	25
7	Welding, Cutting, and Joining: Metal Welding, Cutting, and Joining	52
8	Damage Analysis, Estimating, and Customer Service: Safety Precautions	22
9	Damage Analysis, Estimating, and Customer Service: Damage Analysis	22
10	Damage Analysis, Estimating, and Customer Service: Estimating	22
11	Damage Analysis, Estimating, and Customer Service: Vehicle Construction and Parts	22
Total		**280**

Collision Repair Technician – Non-Structural II—Course Code: ######

Unit	Unit Name	Hours
12	Orientation and Safety Review	10
13	Damage Analysis, Estimating, and Customer Service: Customer Relations and Sales Skills	10
14	Basic Non-Structural Analysis and Damage Repair: Outer Body Panel Repairs, Replacements, and Adjustments	60
15	Non-Structural Analysis and Damage Repair: Metal Finishing and Body Filling	60
16	Non-Structural Analysis and Damage Repair: Moveable Glass and Hardware	50
17	Non-Structural Analysis and Damage Repair: Plastics, Adhesives, and Welding	50
18	Painting and Refinishing: Equipment, Surface Preparation, Mixing, Matching, and Applying	40
Total		**280**

Career Pathway Outlook

Overview
Information listed at the end of each course was considered during the revision process. The ASE Education Foundation content was especially useful in providing insight into trends and issues in the field. The references in Appendix A are suggested for use by instructors and students during the study of the topics outlined. Advisory team members throughout the state worked to revise the curriculum framework. Educators and industry indicate that the soft skills needed in this program include the following traits: maintaining a positive attitude, being at work every day and on time, and having reading and writing skills related to the collision repair field.

Needs of the Future Workforce
Data for this synopsis were compiled from the Mississippi Department of Employment Security (2018). Employment opportunities for each of the occupations listed below are:

Table 1.1: Current and Projected Occupation Report

Description	Jobs, 2018	Projected Jobs, 2028	Change (Number)	Change (Percent)	Average Hourly Earnings, 2021
Automotive Body and Related Repairers	1,140	1,140	0	0%	$20.63
Automotive Glass Installers and Repairers	170	170	0	0%	$16.93

Source: Mississippi Department of Employment Security; mdes.ms.gov (2021).

Perkins V Requirements and Academic Infusion
The collision repair technician curriculum meets Perkins V requirements of introducing students to and preparing them for high-skill, high-wage occupations in collision repair fields. It also offers students a program of study, including secondary, postsecondary, and institutions of higher learning courses, that will further prepare them for collision repair careers. Additionally, this curriculum is integrated with academic college- and career-readiness standards. Lastly, it focuses on ongoing and meaningful professional development for teachers as well as relationships with industry.

Transition to Postsecondary Education
The latest articulation information for secondary to postsecondary can be found at the Mississippi Community College Board website, mccb.edu.

Best Practices

Innovative Instructional Technologies

Classrooms should be equipped with tools that will teach today's digital learners through applicable and modern practices. The collision repair educator's goal should be to include teaching strategies that incorporate current technology. To make use of the latest online communication tools—wikis, blogs, podcasts, and social media platforms, for example—the classroom teacher is encouraged to use a learning management system that introduces students to education in an online environment and places more of the responsibility of learning on the student.

Differentiated Instruction

Students learn in a variety of ways, and numerous factors—students' background, emotional health, and circumstances, for example—create unique learners. By providing various teaching and assessment strategies, students with various learning preferences can have more opportunities to succeed.

CTE Student Organizations

Teachers should investigate opportunities to sponsor a student organization. There are several here in Mississippi that will foster the types of learning expected from the collision repair technician curriculum. SkillsUSA is an example of a student organization with many outlets for collision repair. Student organizations provide participants and members with growth opportunities and competitive events. They also open the doors to the world of collision repair careers and scholarship opportunities.

Cooperative Learning

Cooperative learning can help students understand topics when independent learning cannot. Therefore, you will see several opportunities in the collision repair technician curriculum for group work. To function in today's workforce, students need to be able to work collaboratively with others and solve problems without excessive conflict. The collision repair technician curriculum provides opportunities for students to work together and help each other complete complex tasks. There are many field experiences within the collision repair technician curriculum that will allow and encourage collaboration with professionals currently in the collision repair field.

Work-Based Learning

Work-based learning is an extension of understanding competencies taught in the collision repair technician classroom. This curriculum is designed in a way that necessitates active involvement by the students in the community around them and the global environment. These real-world connections and applications link all types of students to knowledge, skills, and professional dispositions. Work-based learning should encompass ongoing and increasingly more complex involvement with local companies and collision repair professionals. Thus, supervised collaboration and immersion into the collision repair field around the students are keys to students' success, knowledge, and skills development.

Professional Organizations

Association for Career and Technical Education (ACTE)
acteonline.org

SkillsUSA
skillsusa.org

Using This Document

Competencies and Suggested Objectives
A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students are expected to receive instruction on all competencies. The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level. Teachers are welcome to teach the competencies in other ways than the listed objectives if it allows for mastery of the competencies. Teachers are also allowed to teach the units and competencies in the order that they prefer, as long as they teach necessary material allotted for that specific course or credit they are teaching at the time.

Teacher Resources
Teacher resources for this curriculum may be found in multiple places. Many program areas have teacher resource documents that accompany the curriculum and can be downloaded from the same site as the curriculum. The teacher resource document contains references, lesson ideas, websites, teaching and assessment strategies, scenarios, skills to master, and other resources divided by unit. This document could be updated periodically by RCU staff. Please check the entire document, including the entries for each unit, regularly for new information. If you have something you would like to add or have a question about the document, call or email the RCU's instructional design specialist for your program. The teacher resource document can be downloaded at rcu.msstate.edu/curriculum/curriculumdownload.aspx. All teachers should request to be added to the Canvas Resource Guide for their course. This is where all resources will be housed in the future if they are not already. To be added to the guide, send a Help Desk ticket to the RCU by emailing helpdesk@rcu.msstate.edu.

Perkins V Quality Indicators and Enrichment Material
Many of the units include an enrichment section at the end. If the collision repair technician program is currently using the Mississippi Career Planning and Assessment System (MS-CPAS) as a measure of accountability, the enrichment section of material will not be tested. If this is the case, it is suggested to use the enrichment material when needed or desired by the teacher and if time allows in the class. This material will greatly enhance the learning experiences for students. If, however, the collision repair technician program is using a national certification or other measure of accountability that aligns with Perkins V as a quality indicator, this material could very well be tested. It is the responsibility of the teacher to ensure all competencies for the selected assessment are covered throughout the year.

Unit 1: Orientation

Competencies and Suggested Objectives
1. Describe local program and career and technical center policies and procedures. DOK1 a. Describe local program and career and technical center policies and procedures, including dress code, attendance, academic requirements, discipline, and transportation regulations.
2. Describe employment opportunities and responsibilities. DOK1 a. Describe employment opportunities, including potential earnings, employee benefits, job availability, place of employment, working conditions, and educational requirements. b. Describe basic employee responsibilities. c. Explain collision repair industry pay scales, including flat rate, salary, and hourly. d. Describe ASE certifications related to the collision repair industry.
3. Explore leadership skills and personal development opportunities provided by the student organization SkillsUSA. DOK1 a. Demonstrate effective team building and leadership skills. b. Practice appropriate work ethics. c. Explain the purpose, mission, objectives, motto, colors, official dress, and other distinguishing characteristics of SkillsUSA. d. Explain how participation in SkillsUSA can promote lifelong responsibility for community service, professional growth, and development. e. Explore the local, state, and national opportunities available to students through participation in SkillsUSA, including, but not limited to, conferences, competitions, community service, philanthropy, and other activities.

Unit 2: Workplace Employability Skills

Competencies and Suggested Objectives
1. Demonstrate the following personal standards. DOK1 a. Report to work on time daily, ready to take directions and demonstrate motivation to accomplish the task at hand. b. Dress appropriately and use language and manners suitable for the workplace. c. Maintain appropriate personal hygiene. d. Meet and maintain employment eligibility criteria such as drug/alcohol-free status, clean driving record, and so forth. e. Demonstrate honesty, integrity, and reliability.
2. Demonstrate the ability to follow verbal and written instructions and communicate effectively in on-the-job situations. DOK2 a. Comply with workplace policies/laws. b. Contribute to the success of the team, assist others, and request help when needed. c. Work well with all customers and coworkers. d. Negotiate solutions to interpersonal and workplace conflicts. e. Contribute ideas and demonstrate initiative. f. Follow directions. g. Communicate (written and verbally) effectively with customers and coworkers. h. Read and interpret workplace documents. Write clearly and concisely. i. Analyze and resolve problems that arise in completing assigned tasks. j. Organize and implement a productive plan of work. k. Use scientific, technical, engineering, and mathematics principles and reasoning to accomplish assigned tasks. l. Identify and address the needs of all customers. Provide helpful, courteous, and knowledgeable service and advice as needed. m. Communicate effectively with customers, colleagues, and employers to include conflict resolution.

Unit 3: Collision Repair Shop and Personal Safety

Competencies and Suggested Objectives

1. Identify and describe general safety rules. DOK1
    a. Identify general shop safety rules and procedures.
    b. Utilize safe procedures for handling of tools and equipment.
    c. Identify and use proper placement of floor jacks and jack stands.
    d. Identify and use proper procedures for safe lift operation.
    e. Utilize proper ventilation procedures for working within the lab/shop area.
    f. Identify marked safety areas.
    g. Identify the location and the types of fire extinguishers and other fire safety equipment.
    h. Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
    i. Identify the location and use of eyewash stations.
    j. Identify the location of the posted evacuation routes.
    k. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
    l. Identify and wear appropriate clothing for lab/shop activities.
    m. Secure hair and jewelry for lab/shop activities.
    n. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high-voltage circuits.
    o. Demonstrate awareness of the safety aspects of high-voltage circuits (e.g., high-intensity discharge [HID] lamps, ignition systems, injection systems, etc.).
    p. Locate and demonstrate knowledge of safety data sheets (SDS).
    q. Identify and explain the procedures for lifting heavy objects.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.

Unit 4: Tools and Equipment

Competencies and Suggested Objectives
1. Explore tools and equipment used in the collision repair service industry. DOK1 a. Identify tools and their usage in collision applications. b. Identify standard and metric designation. c. Demonstrate safe handling and use of appropriate tools. d. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. e. Demonstrate proper use of precision measuring tools (e.g., micrometer, dial indicator, dial caliper).

Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 5: Preparing a Vehicle for Service

Competencies and Suggested Objectives
1. Explore the procedures for preparing a vehicle for collision service. DOK2 a. Review the damage report and analyze the damage to determine appropriate methods for overall repair. Develop and document a repair plan. b. Inspect, remove, protect, label, store, inventory, and reinstall exterior trim and moldings. c. Inspect, remove, protect, label, store, inventory, and reinstall interior trim and components. d. Inspect, remove, protect, label, store, inventory, and reinstall body panels and components that may interfere with or be damaged during repair. e. Inspect, remove, protect, label, store, inventory, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair. f. Protect panels, glass, interior parts, and other vehicles adjacent to the repair area. g. Soap and water wash the entire vehicle and complete the pre-repair inspection checklist. h. Prepare the damaged area using water-based and solvent-based cleaners. i. Remove corrosion protection, undercoating, sealers, and other protective coatings as necessary to perform repairs. j. Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair.

Unit 6: Welding, Cutting, and Joining: Safety Precautions

Competencies and Suggested Objectives
1. Inspect, analyze, perform, and evaluate procedures and skills pertaining to welding, cutting, and joining safety precautions DOK 2 a. Select and use proper personal safety equipment. Take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations. b. Locate original equipment manufacturer (OEM) procedures to identify materials and composition of the vehicle being repaired (e.g., mild steel, high strength steel, ultra-high strength steel, aluminum, etc.). c. Locate procedures and precautions that may apply to the vehicle being repaired. d. Identify vehicle system precautions and/or inspections to include, but not limited to, SRS, advanced driver assistance systems (ADAS), hybrid/electric/alternative fuel vehicles, locations, and recommended procedures before inspecting or replacing components. e. Perform vehicle clean-up. Complete quality control using a checklist on operations performed.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.

Unit 7: Welding, Cutting, and Joining:Metal Welding, Cutting, and Joining

Competencies and Suggested Objectives

1. Inspect, analyze, perform, and evaluate procedures and skills pertaining to metal welding, cutting, and joining. DOK 2
   a. Identify the considerations for cutting, removing, and welding various types of steel, aluminum, and other metals.
   b. Determine the correct GMAW welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation.
   c. Set up, attach a work clamp (i.e., ground), and adjust the GMAW welder to "tune" for proper electrode stick out, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded.
   d. Store, handle, and install high-pressure gas cylinders. Test for leaks.
   e. Determine the proper angle of the gun to the joint and direction of gun travel for the type of weld being made.
   f. Protect adjacent panels, glass, vehicle interior, and so forth from welding and cutting operations.
   g. Identify hazards (e.g., foam coatings, flammable materials, etc.) prior to welding/cutting procedures.
   h. Protect computers and other electronics/wires prior to welding procedures.
   i. Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp or tack as required.
   j. Determine the joint type (e.g., butt weld with backing, lap, etc.) for the weld being made.
   k. Determine the type of weld (e.g., continuous, stitch weld, plug, etc.) for each specific welding operation.
   l. Perform the following welds: plug, butt weld with and without backing, fillet, and so forth, in the flat, horizontal, vertical, and overhead positions.
   m. Perform a visual evaluation and destructive test on each weld type.
   n. Identify the causes of various welding defects. Make the necessary adjustments.
   o. Identify the causes of contact tip burn-back and the failure of wire to feed. Make the necessary adjustments.
   p. Identify the cutting process for different substrates and locations. Perform the cutting operation.
   q. Identify different methods of attaching structural components (e.g., squeeze-type resistance spot welding [STRSW], riveting, structural adhesive, MIG bronze brazing, rivet bonding, weld bonding, etc.).

Unit 8: Damage Analysis, Estimating, and Customer Service: Safety Precautions

Competencies and Suggested Objectives
1. Identify and describe safety precautions. DOK 2 a. Select and use proper personal safety equipment. Take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations. b. Locate OEM procedures to identify material and composition of the vehicle being repaired (e.g., mild steel, high strength steel, ultra-high strength steel, aluminum, etc.). c. Locate procedures and precautions that may apply to the vehicle being repaired. d. Identify vehicle system precautions and/or inspections to include, but not limited to, SRS, advanced driver assistance systems (ADAS), hybrid/electric/alternative fuel vehicles, locations, and recommended procedures before inspecting or replacing components. e. Perform vehicle clean-up. Complete quality control using a checklist on operations performed.

Unit 9: Damage Analysis, Estimating, and Customer Service: Damage Analysis

Competencies and Suggested Objectives

1. Identify and describe damage analysis. DOK 2
   a. Position the vehicle for inspection under proper lighting. Take photos to identify the vehicle and document damage.
   b. Identify components to be removed to gain access to damaged areas.
   c. Analyze damage to determine appropriate methods for overall repairs.
   d. Determine the direction, point(s) of impact, and extent of direct, indirect, and inertia damage.
   e. Gather details of the incident/accident necessary to determine the full extent of the vehicle damage.
   f. Identify and record preexisting damage.
   g. Identify and record prior repairs.
   h. Perform a visual inspection of structural components.
   i. Identify structural damage using measuring tools and equipment.
   j. Perform a visual inspection of non-structural components.
   k. Determine parts, components, material type(s), and procedures necessary for a proper repair.
   l. Identify the type and condition of the finish. Determine refinish labor operations as required.
   m. Identify suspension, electrical, and mechanical component physical damage.
   n. Identify safety systems physical damage.
   o. Identify interior component damage.
   p. Identify add-on accessories and modifications.
   q. Identify single-use (i.e., one-time use) components.
   r. Identify and document illuminated dash malfunction indicator lamp(s) (MIL).
   s. Perform a pre-repair inspection of the vehicle with the customer. Record fit and finish concerns (e.g., color mismatch, factory gaps, unrelated prior damage, prior repairs, etc.).

Unit 10: Damage Analysis, Estimating, and Customer Service: Estimating

Competencies and Suggested Objectives

1. Discuss and apply estimating processes. DOK2
   a. Determine and record customer/vehicle owner information.
   b. Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, build data, and assembly plant.
   c. Identify and record vehicle mileage and options, including trim level, paint code, transmission, accessories, and modifications.
   d. Identify safety systems. Determine precautions, inspections, and replacement items as required.
   e. Apply appropriate estimating and parts nomenclature (i.e., terminology).
   f. Determine and apply the appropriate estimating sequence.
   g. Utilize estimating procedure pages.
   h. Apply estimating footnotes, headnotes, and line notes as needed.
   i. Identify operations requiring labor value judgment.
   j. Select the appropriate labor code for each operation (e.g., structural, non-structural, mechanical, and refinish).
   k. Select and price OEM parts; optional OEM parts, aftermarket parts, recyclable/used parts, remanufactured, rebuilt, and reconditioned parts. Verify availability, compatibility, and condition.
   l. Determine necessary sublet operations.
   m. Determine included and non-included operations and miscellaneous items.
   n. Recognize and apply overlap deductions.
   o. Determine additional material and charges.
   p. Determine refinishing material and charges.
   q. Apply math skills to establish charges and totals.
   r. Identify differences between computer generated and manually written estimates.
   s. Identify procedures to restore corrosion protection. Establish labor values and material charges.
   t. Recognize the cost effectiveness of the repair and determine the approximate vehicle retail and repair value.
   u. Recognize the differences in estimating platforms when using different information provider systems.
   v. Verify the accuracy of the estimate compared to the actual repair and replacement operations.

w. Determine the telematic/connectivity of the vehicle and place the vehicle in service mode.
x. Identify vehicle safety recalls using the VIN.
y. Review the damage report and analyze the damage to determine appropriate methods for overall repair. Communicate with team members to verify accuracy and resolve discrepancies.

Unit 11: Damage Analysis, Estimating, and Customer Service: Vehicle Construction and Parts Identification

Competencies and Suggested Objectives
1. Discuss vehicle construction and parts identification. DOK2 a. Identify the type of vehicle construction (e.g., unibody, body-over-frame). b. Recognize damage between unibody and body-over-frame vehicles. c. Identify impact energy-absorbing components. d. Identify different types of substrates (e.g., steel types, aluminum, magnesium, plastic, composites, etc.). Determine repairability. e. Identify vehicle glass components and repair/replacement procedures. f. Identify add-on accessories.

Unit 12: Orientation and Safety Review

Competencies and Suggested Objectives
1. Describe local program and career and technical center policies and procedures. DOK1 a. Describe local program and career and technical center policies and procedures, including dress code, attendance, academic requirements, discipline, and transportation regulations.
2. Describe employment opportunities and responsibilities. DOK1 a. Describe employment opportunities, including potential earnings, employee benefits, job availability, place of employment, working conditions, and educational requirements. b. Describe basic employee responsibilities. c. Design a résumé and letter of application and complete a job application. d. Explain collision repair industry pay scales, including flat rate, salary and hourly. e. Describe ASE certifications related to the collision repair industry.
3. Explore leadership skills and personal development opportunities provided by the student organization SkillsUSA. DOK1 a. Demonstrate effective team building and leadership skills. b. Practice appropriate work ethics. c. Explain the purpose, mission, objectives, motto, colors, official dress, and other distinguishing characteristics of SkillsUSA. d. Explain how participation in SkillsUSA can promote lifelong responsibility for community service, professional growth, and development. e. Explore the local, state, and national opportunities available to students through participation in SkillsUSA, including, but not limited to, conferences, competitions, community service, philanthropy, and other activities.
4. Describe general safety rules for working in a shop/lab and industry. DOK2 a. Discuss safety issues and prevention associated with the collision repair shop area. b. Explain fire safety and prevention in the workplace.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.

Unit 13: Damage Analysis, Estimating, and Customer Service: Customer Relations and Sales Skills

Competencies and Suggested Objectives
1. Discuss customer relations and sales skills. DOK2 a. Introduce yourself and acknowledge and greet the customer/client/visitor. Offer assistance. b. Listen to the customer/client, collect information, and identify the customer's/client's concerns, needs, and expectations. c. Establish a cooperative attitude with the customer/client. d. Deal with a dissatisfied customer/client. Seek resolution. e. Identify the customer's/client's preferred communication method. Follow up to keep the customer/client informed about parts and the repair process. f. Recognize basic claims handling procedures. Explain the procedures to the customer/client. g. Project a positive attitude and professional appearance. h. Provide and review warranty information. i. Provide and review technical and consumer protection information. j. Estimate and explain the duration of out-of-service time. k. Demonstrate negotiation skills to obtain a mutual agreement. l. Interpret and explain the estimate to the customer/client.

Unit 14: Basic Non-Structural Analysis and Damage Repair: Outer Body Panel Repairs, Replacements, and Adjustments

Competencies and Suggested Objectives

1. Inspect, analyze, perform, and evaluate procedures and skills pertaining to outer body panel repairs, replacements, and adjustments. DOK 2
   a. Inspect/locate direct, indirect, or hidden damage and the direction of impact.
   b. Inspect, remove, and replace the welded steel panel or panel assemblies.
   c. Determine the extent of damage to aluminum body panels and repair or replace.
   d. Inspect, remove, replace, and align a hood, hood hinges, and hood latch.
   e. Inspect, remove, replace, and align a deck lid, lid hinges, and lid latch.
   f. Inspect, remove, replace, and align doors, latches, hinges, and related hardware.
   g. Inspect, remove, replace, and align tailgates, hatches, liftgates, and sliding doors.
   h. Inspect, remove, replace, overhaul, and align bumpers, covers, reinforcements, guards, impact absorbers, and mounting hardware.
   i. Inspect, remove, replace, and align fenders and related panels.
   j. Restore corrosion protection during and after the repair.
   k. Replace door skins.
   l. Restore sound deadeners and foam materials.
   m. Perform panel bonding and weld bonding.
   n. Diagnose and repair water leaks, dust leaks, and wind noise.
   o. Identify one-time use fasteners.
   p. Weld damaged or torn steel body panels and repair broken welds.
   q. Inspect and identify labels/decals and replace as necessary.

Unit 15: Non-Structural Analysis and Damage Repair: Metal Finishing and Body Filling

Competencies and Suggested Objectives

1. Inspect, analyze, perform, and evaluate procedures and skills pertaining to metal finishing and body filling. DOK 2
   a. Prepare a panel for body filler by abrading or removing the coatings. Featheredge, refine scratches, and clean the surface before the application of body filler.
   b. Locate and repair surface irregularities and straighten contours on a damaged body panel using power tools, hand tools, and weld-on pulling attachments.
   c. Demonstrate hammer and dolly techniques.
   d. Heat shrink stretched panel areas to proper contour.
   e. Cold shrink stretched panel areas to proper contour.
   f. Identify body filler defects. Correct the cause and condition (e.g., pinholing, ghosting, staining, over-catalyzing, etc.).
   g. Identify different types of body fillers.
   h. Shape body filler to contour; finish sand.
   i. Perform proper metal finishing techniques for aluminum.
   j. Perform proper application of body filler to aluminum.
   k. Locate and repair surface irregularities and straighten contours on a damaged panel using Glue-Pulling Dent Repair (GPDR).
   l. Mix and apply body filler.

Unit 16: Non-Structural Analysis and Damage Repair: Moveable Glass and Hardware

Competencies and Suggested Objectives
1. Inspect, analyze, perform, and evaluate procedures and skills pertaining to moveable glass and hardware. DOK 2 a. Inspect, adjust, overhaul repair, or replace window regulators, run channels, glass, power mechanisms, and related controls. b. Inspect, adjust, repair, remove, reinstall, or replace weather stripping. c. Inspect, remove, repair, or replace, and adjust removable power-operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs. d. Inspect, remove, reinstall, and align a convertible top and related mechanisms. e. Identify or recalibrate electrical components that may need to be initialized.

Unit 17: Non-Structural Analysis and Damage Repair: Plastics, Adhesives, and Welding

Competencies and Suggested Objectives
1. Inspect, analyze, perform, and evaluate procedures and skills pertaining to plastics, adhesives, and welding. DOK 2 a. Identify the types of plastics. Determine repairability. b. Clean and prepare the surface of plastic parts. Identify the types of plastic repair procedures. c. Repair rigid, semi-rigid, and flexible plastic panels. d. Remove, replace, or repair damaged areas of rigid exterior composite panels. e. Replace bonded rigid exterior composite body panels. Straighten or align panel supports. f. Repair plastic parts by welding (e.g., nitrogen, airless). g. Perform a single-sided adhesively bonded cosmetic repair. h. Perform a double-sided adhesively bonded repair. i. Perform an adhesively bonded or welded tab repair. j. Shape and reform damaged plastic.

Unit 18: Painting and Refinishing: Equipment, Surface Preparation, Mixing, Matching, and Applying

Competencies and Suggested Objectives

1. Evaluate and perform procedures as they pertain to spray gun and related equipment operation. DOK2
   a. Inspect, clean, and determine the condition of spray guns and related equipment (e.g., air hoses, regulators, air lines, air source, spray environment, and fillers).
   b. Select a spray gun setup for the product being applied (e.g., fluid needle, nozzle, cap).
   c. Test and adjust a spray gun using fluid, air, and pattern control valves
   d. Demonstrate an understanding of the operation of pressure spray equipment.

2. Explain procedures as they pertain to surface preparation. DOK2
   a. Inspect, remove, store, protect, and replace exterior trim and components necessary for proper surface preparation.
   b. Soap and water wash the entire vehicle. Use the appropriate cleaner to remove contaminants.
   c. Inspect and identify the type of finish, surface condition, and film thickness. Develop and document a plan for refinishing using a total product system.
   d. Remove the paint finish as needed.
   e. Properly sand the areas to be refinished.
   f. Identify and select the appropriate sandpaper to featheredge the areas to be refinished.
   g. Apply a suitable metal treatment or primer in accordance with total product systems.
   h. Mask and protect other areas that will not be refinished.
   i. Demonstrate different masking techniques (e.g., recess/back masking, foam door type, etc.).
   j. Mix primer, primer-surfacer, and primer-sealer following paint manufacturers' technical data sheet instructions.
   k. Identify a complimentary color or shade of undercoat to improve coverage.
   l. Apply primer to the surface of a repaired area, demonstrating control of primer application by keeping the area as small as possible.
   m. Apply two-component finishing filler to minor surface imperfections.
   n. Guide coat and block sand the area with the correct grade/grit sandpaper to which primer-surfacer has been applied.
   o. Dry sand the area to which two-component finishing filler has been applied.
   p. Remove dust from the area to be refinished, including cracks or moldings of adjacent areas.
   q. Clean the area to be refinished using a recommended final cleaning solution.
   r. Remove, with a tack rag, any dust or lint particles from the area to be refinished.
   s. Apply a suitable primer-sealer to the area being refinished.

t. Scuff sand to remove nibs or imperfections from a sealer.
u. Apply a stone chip-resistant coating.
v. Restore caulking and seam sealers to repaired areas and replacement panels as required.
w. Prepare adjacent panels for blending using paint manufacturers' procedures.
x. Identify the types of rigid, semi-rigid, or flexible plastic parts to be refinished. Determine the materials needed and the preparation and refinishing procedures.
y. Identify metal parts to be refinished. Determine the materials needed and the preparation and refinishing procedures.
z. Identify chip-resistant coatings and texture match.
aa. Identify caulking and seal sealers that may need replacement.
bb. Identify refinishing guidelines for stationary glass flange areas to be refinished.

3. Introduce and discuss procedures as they pertain to the skills of paint mixing, matching, and applying. DOK2
   a. Identify the color code by the manufacturer's vehicle information label.
   b. Shake, stir, reduce, catalyze/activate, and strain refinish materials.
   c. Apply finish using the appropriate spray techniques for the finish being applied (e.g., gun arc, angle, distance, travel speed, spray pattern overlap).
   d. Apply a selected product on a test or let-down panel. Check for a color match, properly store and maintain a color catalog.
   e. Understand the application of single-stage topcoats.
   f. Apply a basecoat/clearcoat for panel blending, panel refinishing, and cut-ins.
   g. Apply a basecoat/clearcoat for overall refinishing.
   h. Remove nibs or imperfections from a basecoat.
   i. Identify product expiration dates as applicable.
   j. Refinish plastic parts.
   k. Apply multi-stage coats for panel blending and overall refinishing.
   l. Identify and mix paint using a formula.
   m. Identify poor hiding colors. Determine the necessary action.
   n. Tint color using a formula to achieve a blendable match.
   o. Identify an alternative color formula to achieve a blendable match.
   p. Identify the materials, equipment, and preparation differences between solvent and waterborne technologies.

Source: *Miss. Code Ann. §§ 37-1-3 and 37-31-103*

Student Competency Profile

Student's Name: _____

This record is intended to serve as a method of noting student achievement of the competencies in each unit, which are the tasks that are necessary to be mastered to pass the national certification. It can be duplicated for each student, and it can serve as a cumulative record of competencies achieved in the course.

Student's degree of competency will be noted using the following scale:

5 Mastered competencies. Able to perform all elements of the task successfully and independently without supervision.
4 Satisfactory performance of task. Acceptable performance of all elements of task with mastery of some elements.
3 Capable of performing task adequately, but some elements need improvement.
2 Satisfactory performance of some elements of task and unsatisfactory performance of some elements of task.
1 Unsatisfactory performance of task.
0 **Student missed task**

Collision Repair Technician: Units 1, 3, and 4		
Orientation		
	1.	Describe local program and career and technical center policies and procedures.[DOK1].
	2.	Describe employment opportunities and responsibilities. [DOK1]
	3.	Explore leadership skills and personal development opportunities provided by the student organization SkillsUSA. [DOK1]
Collision Repair Shop and Personal Safety		
	1.	Identify and describe general safety rules. [DOK1]
Tools and Equipment		
	1.	Explore tools and equipment used in the collision repair service industry. [DOK1]

Required Supplemental Tasks: ASE Collision Standards			
Workplace Employability Skills			
Personal Standards (Standard 7.9)			
	1.	Report to work on time daily, ready to take directions and demonstrate motivation to accomplish the task at hand.	
	2.	Dress appropriately and use language and manners suitable for the workplace.	
	3.	Maintain personal hygiene appropriate to the workplace.	
	4.	Meet and maintain employment eligibility criteria such as drug/alcohol-free status, clean driving record, and so forth.	
	5.	Demonstrate honesty, integrity, and reliability.	
Work Habits/Ethic (Standard 7.10)			
	1.	Comply with workplace policies/laws.	
	2.	Contribute to the success of the team, assist others, and request help when needed.	
	3.	Work well with all customers and coworkers.	
	4.	Negotiate solutions to interpersonal and workplace conflicts.	
	5.	Contribute ideas and demonstrate initiative.	
	6.	Follow directions.	
	7.	Communicate (written and verbally) effectively with customers and coworkers.	
	8.	Read and interpret workplace documents. Write clearly and concisely.	
	9.	Analyze and resolve problems that arise in completing assigned tasks.	
	10.	Organize and implement a productive plan of work.	
	11.	Use scientific, technical, engineering, and mathematics principles and reasoning to accomplish assigned tasks.	
	12.	Identify and address the needs of all customers. Provide helpful, courteous, and knowledgeable service and advice as needed.	
	13.	Respect tools and property used in a school and workplace environment.	

Welding, Cutting, and Joining			
For every task in Welding, Cutting and Joining, the following safety requirements must be strictly enforced: Comply with personal and environmental safety practices associated with clothing and proper personal protection equipment (PPE); hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations. Identify vehicle system precautions and/or inspections including, but not limited to, supplemental restraint system (SRS) inspection, advanced driver assistance systems (ADAS), hybrid/electric/alternative fuel vehicles, locations, and recommended procedures before inspecting or replacing components.			
A. Safety Precautions			
	1.	Select and use proper personal safety equipment. Take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations.	
	2.	Locate OEM procedures to identify material and composition of the vehicle being repaired (e.g., mild steel, high strength steel, ultra-high strength steel, aluminum, etc.).	
	3.	Locate procedures and precautions that may apply to the vehicle being repaired.	
	4.	Identify vehicle system precautions and/or inspections to include, but not limited to, supplemental restraint systems (SRS), advanced driver assistance systems (ADAS), hybrid/electric/alternative fuel vehicles, locations, and recommended procedures before inspecting or replacing components.	
	5.	Perform vehicle clean-up. Complete quality control using a checklist on operations performed.	
B. Metal Welding, Cutting, and Joining			
	1.	Identify the considerations for cutting, removing, and welding various types of steel, aluminum, and other metals.	
	2.	Determine the correct GMAW welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation.	
	3.	Set up, attach a work clamp (i.e., ground), and adjust the GMAW welder to “tune” for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded.	
	4.	Store, handle, and install high-pressure gas cylinders. Test for leaks.	
	5.	Determine the proper angle of the gun to the joint and direction of gun travel for the type of weld being made.	

	6.	Protect adjacent panels, glass, vehicle interior, and so forth from welding and cutting operations.	
	7.	Identify hazards; foam coatings and flammable materials prior to welding/cutting procedures.	
	8.	Protect computers and other electronics/wires prior to welding procedures.	
	9.	Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp or tack as required.	
	10.	Determine the joint type (butt weld with backing, lap, etc.) for weld being made	
	11.	Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation.	
	12.	Perform the following welds: plug, butt weld with and without backing, fillet, and so forth, in the flat, horizontal, vertical, and overhead positions.	
	13.	Perform a visual evaluation and destructive test on each weld type.	
	14.	Identify the causes of various welding defects. Make the necessary adjustments.	
	15.	Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.	
	16.	Identify the cutting process for different substrates and locations. Perform the cutting operation.	
	17.	Identify different methods of attaching structural components (e.g., squeeze-type resistance spot welding [STRSW], riveting, structural adhesive, MIG bronze, rivet bonding, weld bonding, etc.).	

Damage Analysis, Estimating, And Customer Service			
For every task in Damage Analysis, Estimating, and Customer Service, the following safety requirements must be strictly enforced: Comply with personal and environmental safety practices associated with clothing and proper personal protection equipment (PPE); hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations. Identify vehicle system precautions and/or inspections to include, but not limited to, supplemental restraint system (SRS) inspection, advanced driver assistance systems (ADAS), hybrid/electric/alternative fuel vehicles, locations, and recommended procedures before inspecting or replacing components.			
A. Safety Precautions			
	1.	Select and use proper personal safety equipment. Take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations.	
	2.	Locate OEM procedures to identify material and composition of the vehicle being repaired (e.g., mild steel, high strength steel, ultra-high strength steel, aluminum, etc.).	
	3.	Locate procedures and precautions that may apply to the vehicle being repaired.	
	4.	Identify vehicle system precautions and/or inspections to include, but not limited to, supplemental restraint systems (SRS), advanced driver assistance systems (ADAS), hybrid/electric/alternative fuel vehicles, locations, and recommended procedures before inspecting or replacing components.	
	5.	Perform vehicle clean-up. Complete quality control using a checklist on operations performed.	
B. Damage Analysis			
	1.	Position the vehicle for inspection under proper lighting. Take photos to identify the vehicle and document damage.	
	2.	Identify components to be removed to gain access to damaged areas.	
	3.	Analyze damage to determine appropriate methods for overall repairs.	
	4.	Determine the direction, point(s) of impact, and extent of direct, indirect, and inertia damage.	
	5.	Gather details of the incident/accident necessary to determine the full extent of vehicle damage.	

	6.	Identify and record preexisting damage.	
	7.	Identify and record prior repairs.	
	8.	Perform a visual inspection of structural components.	
	9.	Identify structural damage using measuring tools and equipment.	
	10.	Perform a visual inspection of non-structural components.	
	11.	Determine parts, components, material type(s), and procedures necessary for a proper repair.	
	12.	Identify the type and condition of the finish. Determine refinish labor operations as required.	
	13.	Identify suspension, electrical, and mechanical component physical damage.	
	14.	Identify safety systems physical damage.	
	15.	Identify interior component damage.	
	16.	Identify add-on accessories and modifications.	
	17.	Identify single-use (i.e., one-time use) components.	
	18.	Identify and document illuminated dash malfunction indicator lamp(s) (MIL).	
	19.	Perform a pre-repair inspection of the vehicle with the customer. Record fit and finish concerns (e.g., color mismatch, factory gaps, unrelated prior damage, prior repairs, etc.).	
C. Estimating			
	1.	Determine and record customer/vehicle owner information.	
	2.	Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, build data, and assembly plant.	
	3.	Identify and record vehicle mileage and options, including trim level, paint code, transmission, accessories, and modifications.	
	4.	Identify safety systems. Determine precautions, inspections, and replacement items as required.	
	5.	Apply appropriate estimating and parts nomenclature (i.e., terminology).	
	6.	Determine and apply the appropriate estimating sequence.	
	7.	Utilize estimating procedure pages.	
	8.	Apply estimating footnotes, headnotes, and line notes as needed.	

	9.	Identify operations requiring labor value judgment.	
	10.	Select the appropriate labor code for each operation (e.g., structural, non-structural, mechanical, and refinish).	
	11.	Select and price OEM parts; optional OEM parts, aftermarket parts, recyclable/used parts, remanufactured, rebuilt, and reconditioned parts. Verify availability, compatibility, and condition.	
	12.	Determine necessary sublet operations.	
	13.	Determine included and non-included operations and miscellaneous items.	
	14.	Recognize and apply overlap deductions.	
	15.	Determine additional material and charges.	
	16.	Determine refinishing material and charges.	
	17.	Apply math skills to establish charges and totals.	
	18.	Identify differences between computer generated and manually written estimates.	
	19.	Identify procedures to restore corrosion protection. Establish labor values and material charges.	
	20.	Recognize the cost effectiveness of the repair and determine the approximate vehicle retail and repair value.	
	21.	Recognize the differences in estimating platforms when using different information provider systems.	
	22.	Verify the accuracy of the estimate compared to the actual repair and replacement operations.	
	23.	Determine the telematic/connectivity of the vehicle and place the vehicle in service mode.	
	24.	Identify vehicle safety recalls using the VIN.	
	25.	Review the damage report and analyze the damage to determine appropriate methods for overall repair. Communicate with team members to verify accuracy and resolve discrepancies.	
D. Vehicle Construction and Parts Identification			
	1.	Identify the type of vehicle construction (e.g., unibody, body-over-frame).	
	2.	Recognize the different collision damage between unibody and body-over-frame vehicles.	
	3.	Identify impact energy-absorbing components.	

	4.	Identify different types of substrates (e.g., steel types, aluminum, magnesium, plastic, composites, etc.). Determine repairability.	
	5.	Identify vehicle glass components and repair/replacement procedures.	
	6.	Identify add-on accessories.	
E. Customer Relations and Sales Skills			
	1.	Introduce yourself and acknowledge and greet the customer/client/visitor. Offer assistance.	
	2.	Listen to the customer/client, collect information, and identify customer's/client's concerns, needs, and expectations.	
	3.	Establish a cooperative attitude with the customer/client.	
	4.	Deal with a dissatisfied customer/client. Seek resolution.	
	5.	Identify the customer's/client's preferred communication method. Follow up to keep the customer/client informed about parts and the repair process.	
	6.	Recognize basic claims handling procedures. Explain the procedures to the customer/client.	
	7.	Project a positive attitude and professional appearance.	
	8.	Provide and review warranty information.	
	9.	Provide and review technical and consumer protection information.	
	10.	Estimate and explain the duration of out-of-service time.	
	11.	Demonstrate negotiation skills to obtain a mutual agreement.	
	12.	Interpret and explain the estimate to the customer/client.	

Non-Structural Analysis and Damage Repair (Body Components)			
For every task in Non-Structural Analysis and Damage Repair (Body Components), the following safety requirements must be strictly enforced: Comply with personal and environmental safety practices associated with clothing and proper personal protection equipment (PPE); hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations. Identify vehicle precautions and/or inspections to include, but not limited to, supplemental restraint system (SRS) inspection, advanced driver assistance systems (ADAS), hybrid/electric/alternative fuel vehicles, locations, and recommended procedures before inspecting or replacing components.			
A. Safety Precautions			
	1.	Select and use proper personal safety equipment. Take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations.	
	2.	Locate OEM procedures to identify material and composition of the vehicle being repaired (e.g., mild steel, high strength steel, ultra-high strength steel, aluminum, etc.).	
	3.	Locate procedures and precautions that may apply to the vehicle being repaired.	
	4.	Identify vehicle system precautions and/or inspections to include, but not limited to, supplemental restraint systems (SRS), advanced driver assistance systems (ADAS), hybrid/electric/alternative fuel vehicles, locations, and recommended procedures before inspecting or replacing components.	
	5.	Perform vehicle clean-up. Complete quality control using a checklist on operations performed.	
B. Preparation			
	1.	Review the damage report and analyze the damage to determine appropriate methods for overall repair. Develop and document a repair plan.	
	2.	Inspect, remove, protect, label, store, inventory, and reinstall exterior trim and moldings.	
	3.	Inspect, remove, protect, label, store, inventory, and reinstall interior trim and components.	
	4.	Inspect, remove, protect, label, store, inventory, and reinstall body panels and components that may interfere with or be damaged during repair.	
	5.	Inspect, remove, protect, label, store, inventory, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair.	

	6.	Protect panels, glass, interior parts, and other vehicles adjacent to the repair area.	
	7.	Soap and water wash the entire vehicle and complete the pre-repair inspection checklist.	
	8.	Prepare the damaged area using water-based and solvent-based cleaners.	
	9.	Remove corrosion protection, undercoating, sealers, and other protective coatings as necessary to perform repairs.	
	10.	Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair.	
C. Outer Body Panel Repairs, Replacements, and Adjustments			
	1.	Inspect/locate direct, indirect, or hidden damage and the direction of impact.	
	2.	Inspect, remove, and replace the welded steel panel or panel assemblies.	
	3.	Determine the extent of damage to aluminum body panels and repair or replace.	
	4.	Inspect, remove, replace, and align a hood, hood hinges, and hood latch.	
	5.	Inspect, remove, replace, and align a deck lid, lid hinges, and lid latch.	
	6.	Inspect, remove, replace, and align doors, latches, hinges, and related hardware.	
	7.	Inspect, remove, replace, and align tailgates, hatches, liftgates, and sliding doors.	
	8.	Inspect, remove, replace, overhaul, and align bumpers, covers, reinforcements, guards, impact absorbers, and mounting hardware.	
	9.	Inspect, remove, replace, and align fenders and related panels.	
	10.	Restore corrosion protection during and after the repair.	
	11.	Replace door skins.	
	12.	Restore sound deadeners and foam materials.	
	13.	Perform panel bonding and weld bonding.	
	14.	Diagnose and repair water leaks, dust leaks, and wind noise.	
	15.	Identify one-time use fasteners.	
	16.	Weld damaged or torn steel body panels and repair broken welds.	
	17.	Inspect and identify labels/decals and replace as necessary.	
D. Metal Finishing and Body Filling			

	1.	Prepare a panel for body filler by abrading or removing the coatings. Featheredge, refine scratches, and clean the surface before the application of body filler.	
	2.	Locate and repair surface irregularities and straighten contours on a damaged body panel using power tools, hand tools, and weld-on pulling attachments.	
	3.	Demonstrate hammer and dolly techniques.	
	4.	Heat shrink stretched panel areas to proper contour.	
	5.	Cold shrink stretched panel areas to proper contour.	
	6.	Identify body filler defects. Correct the cause and condition (e.g., pinholing, ghosting, staining, over-catalyzing, etc.)	
	7.	Identify different types of body fillers.	
	8.	Shape body filler to contour. Finish sand.	
	9.	Perform proper metal finishing techniques for aluminum.	
	10.	Perform proper application of body filler to aluminum.	
	11.	Locate and repair surface irregularities and straighten contours on a damaged panel using Glue-Pulling Dent Repair (GPDR).	
	12.	Mix and apply body filler.	
E. Moveable Glass and Hardware			
	1.	Inspect, adjust, overhaul repair, or replace window regulators, run channels, glass, power mechanisms, and related controls.	
	2.	Inspect, adjust, repair, remove, reinstall, or replace weather stripping.	
	3.	Inspect, remove, repair, or replace, and adjust removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs.	
	4.	Inspect, remove, reinstall, and align a convertible top and related mechanisms.	
	5.	Identify or recalibrate electrical components that may need to be initialized.	
F. Plastics, Adhesives, and Welding			
	1.	Identify the types of plastics. Determine repairability.	
	2.	Clean and prepare the surface of plastic parts. Identify the types of plastic repair procedures.	
	3.	Repair rigid, semi-rigid, and flexible plastic panels.	

	4.	Remove, replace, or repair damaged areas of rigid exterior composite panels.	
	5.	Replace bonded rigid exterior composite body panels. Straighten or align panel supports.	
	6.	Repair plastic parts by welding (e.g., nitrogen, airless).	
	7.	Perform a single-sided adhesively bonded cosmetic repair.	
	8.	Perform a double-sided adhesively bonded repair.	
	9.	Perform an adhesively bonded or welded tab repair.	
	10.	Shape and reform damaged plastic.	

Appendix A: Industry Standards

Collision Repair Technician – Non-Structural

	Units	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PS		X		X															
WH		X	X		X														
WSaPr				X			X						X						
WCJ								X					X						
SP									X										
DA						X				X									
E											X								
VCP												X							
CRS														X					
SafPre				X															
PREP						X													
OBPR															X				
MFBF																X			
MGH																	X		
PAW																		X	
BPR																			X

Workplace Employability Skills
PS – Personal Standards
WH – Work Habits

Welding, Cutting, and Joining
WSaPr – (Welding) Safety Precautions
WCJ – Metal Welding, Cutting, and Joining

Damage Analysis, Estimating, and Customer Service
SP – Safety Precautions
DA – Damage Analysis
E – Estimating
VCP – Vehicle Construction and Parts Identification
CRS – Customer Relations and Sales Skills

NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR (BODY COMPONENTS)
SafPre – Safety Precautions
PREP – Preparation
OBPR – Outer Body Panel Repairs, Replacement and Adjustments
MFBF – Metal Finishing and Body Filling
MGH – Moveable Glass and Hardware
PAW – Plastics, Adhesives, and Welding

Paint and Refinishing
BPR – Basic Paint and Refinishing